Aditya Deshpande *Applied Scientist II, Amazon Web Services*

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Education

University of Illinois at Urbana-Champaign
Illinois, USA

PhD in Computer Science *Aug 2014 – May 2020*

Advisors: Prof. David Forsyth and Prof. Alexander Schwing
Thesis Committee: Svetlana Lazebnik, Dhruv Batra, Alexander Schwing, David Forsyth
Thesis Title: Learning Multiple Solutions for Computer Vision Problems

International Institute of Information Technology
Hyderabad, India

B. Tech. with Masters of Science by Research in Computer Science *Aug 2008 – Jul 2014*

Advisor: Prof. P J Narayanan
Thesis: Combining Data and Task Parallelism on CPU and GPU Machines

Professional Experience

🗐 Amazon – AWS AI/ML (*Manager: Avinash Ravichandran*)
Seattle, USA

Applied Scientist II, AWS Computer Vision *Sep, 2019 - Present*

- I research and develop novel computer vision and machine learning algorithms. I write production code to launch the algorithms into AWS Computer Vision services.
- The algorithms are used by many AWS customers and this helps democratize the use of computer vision and machine learning.
- I publish research papers to summarize technical contributions.

🗐 Amazon – AWS AI/ML (*Manager: Joseph Tighe*)
Seattle, USA

Applied Scientist Intern *May, 2018 - Aug, 2018*

- Developed an algorithm to detect visual relationships i.e. interactions between two objects in an image such as man plays guitar, woman kicks football etc.
- The method ranked 10th on leader-board among 140+ submissions in Kaggle competition for ECCV'18 workshop. It was presented as a poster to the workshop audience.

🍎 Apple Research (*Managers: Luciano Spinello, Tie-qi Chen*)
Cupertino, USA

Computer Vision Research Intern *May, 2015 - Aug, 2015 & May, 2016 - Aug, 2016*

- Developed a real-time parallel implementation of stereo algorithm on GPU, this helps obtain depth from two images similar to the two human eyes.
- Implemented a deep learned feature descriptor to match corners of objects in different images.

G⁺ Google Inc (*Manager: Rajesh Chandrashekaran*)
Bengaluru, India

Software Engineering Intern *May, 2011 - Aug, 2011*

- Wrote code for backend & UI of Google Apps C-panel to launch useful features in production.
- Code was written in Java and Google Web Toolkit library.

Awards and Service

- Best GPU Paper Award at IEEE International Conference on High Performance Computing (Dec, 2013).
- **Outstanding Reviewer Award** for IEEE/CVF CVPR 2018 and IEEE/CVF CVPR 2020.
- Top-400 reviewer for NeurIPS 2019, selected to mentor new members of machine learning community.
- **Reviewer for Conferences**: ICCV, ECCV, NeurIPS, CVPR, UAI, ACCV, AAAI, BMVC.
- **Reviewer for Journals**: TPAMI, TIP, JPDC, JACM.
- Awarded **Google Summer of Code (2012) scholarship** to work on CUDA acceleration of OpenJPEG Library.
- Received the **Dean's Merit List** (2008) and **Research Award** (2012) of IIIT Hyderabad.
- Received the **National Talent Search Scholarship (2006)**, awarded to top-1000 10th graders across India.
- Merit position in school exams of **Junior Maths Olympiad**, **National Standard Exam in Physics**.

Selected Talks

- IEEE/CVF Computer Vision and Pattern Recognition 2019, Oral Presentation of "Fast, Diverse and Accurate Image Captioning Guided By Part-of-Speech."
- At – Google AI, Apple 3D Vision, 2019 & Illinois CSL Student Conference, 2019 – Invited Talk on "Learning Multiple Solutions to Computer Vision Problems."
- CS 445 Computational Photography by Prof. Derek Hoiem, 2017, Lecture on "The image as a virtual stage."
- CS 598 Data Driven Design by Prof. Ranjitha Kumar, 2017, Lecture on "Generative Adversarial Networks."

- 2017 Midwest Computer Vision Workshop, Chicago, "Learning Diverse Image Colorization."
- 2016 Midwest Computer Vision Workshop, Chicago, "Learning Large-Scale Automatic Image Colorization."
- IEEE International Conference on High Performance Computing, 2013, Oral Presentation of "Can GPUs Sort Strings Efficiently?"
- IEEE International Conference on High Performance Computing, 2011, Oral Presentation of "Hybrid Implementation of Error-Diffusion Dithering."

Publications

- Fast, Diverse and Accurate Image Captioning Guided By Part-of-Speech, In Proceeedings of IEEE/CVF CVPR'19 (**Oral**). *Aditya Deshpande*, Jyoti Aneja*, Liwei Wang, Alexander Schwing and David Forsyth.*
- Visual Relationship Detection, In ECCV'18 Open Images Challenge Workshop. *Aditya Deshpande, Zhongwei Cheng and Joseph Tighe.*
- Convolutional Image Captioning, In Proceedings of Computer Vision and Pattern Recognition (CVPR'18). *Jyoti Aneja*, Aditya Deshpande* and Alexander Schwing* (*= equal contribution).
- Learning Diverse Image Colorization, In Proceedings of Computer Vision and Pattern Recognition (CVPR' 17). *Aditya Deshpande, Jiajun Lu, Mao-Chuang Yeh, Min Jin Chong and David Forsyth.*
- Recovering the 3D Geometry of Heritage Monuments from Image Collections, In Mallik A., Chaudhury S., Chandru V., Srinivasan S. (eds) Digital Hampi: Preserving Indian Cultural Heritage. Springer, Singapore. *Rajvi Shah, Aditya Deshpande, Anoop Namboodiri, P J Narayanan.*
- Learning Large-Scale Automatic Image Colorization, In Proceedings of International Conference on Computer Vision (ICCV'15). *Aditya Deshpande, Jason Rock and David Forsyth.*
- Fast Burrows Wheeler Compression Using All-Cores. In Ashes workshop of International Parallel and Distributed Processing Symposium (IPDPSW'15) (**Oral**). *Aditya Deshpande and P J Narayanan.*
- Multistage SFM: Revisiting Incremental Structure from Motion, In Proceedings of International Conference on 3D Vision (3DV'14). *Rajvi Shah, Aditya Deshpande and P J Narayanan.*
- Top Down Approach to Detect Multiple Planes from Pair of Images, ACM ICVGIP'14 (**Oral**). *Singhal et al.*
- Can GPUs Sort Strings Efficiently? In Proceedings of IEEE HiPC'13 (**Oral**). *Aditya Deshpande and P J Narayanan.* (Best GPU Paper awarded by Nvidia)
- Geometry Directed Browser for Personal Photographs, In ACM ICVGIP'12 (**Oral**). *Deshpande et al.*
- Hybrid Implementation of Error-Diffusion Dithering, In IEEE HiPC'11 (**Oral**). *Deshpande et al.*

Projects and Technical Contributions

- **Fast Floyd-Steinberg Dithering.**
  Developed a fast dithering algorithm for GPUs; this is a vital component of daily-use printers. This research published in IEEE International Conference on High Performance Computing (HiPC), 2011.

- **Fast String Sorting.**
  Developed a fast string sorting algorithm; it is useful for many software applications such as maintaining dictionary, genomics etc. This research published in IEEE HiPC, 2013 and code available at `https://github.com/aditya12agd5/cuda_stringsort`.

- **Fast Burrows Wheeler Compression.**
  Developed a parallel algorithm to improve speed of bzip data compression and made file compression on computers faster. Work published at ASHES, International Parallel and Distributed Processing Symposium.

- **Multi-stage structure-from-motion and 3D Photo Browser.**
  Developed a multi-stage algorithm for structure-from-motion that first builds a coarse 3d model and then densifies it with more points and camera. This makes structure-from-motion much faster than standard bundler and visual sfm methods. We use our method to create an immersive 3d photo browser.

- **Learning to colorize black and white images.**
  Developed an AI algorithm to add color to black-and-white image; this can help colorize old photos and movies automatically. Further improved this algorithm to produce multiple versions of color photos. Some results available at `https://bit.ly/2NdD4f7`. This research published in International Conference on Computer Vision, 2015 and IEEE Conference on Computer Vision and Pattern Recognition, 2017. The code is made available at `https://github.com/aditya12agd5/divcolor`.

- **Fast, Diverse and Accurate Image Captioning.**
  Developed an AI algorithm that writes a sentence to describe any image. Different humans will describe the image in different ways; our method can also generate multiple descriptions. Generating image description can help in day-to-day tasks of people with visual impairment. This research published in IEEE Conference on Computer Vision and Pattern Recognition, 2018 and 2019. The code available at `https://github.com/aditya12agd5/convcap` is widely used by researchers.